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SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - SEPTEMBER 1984

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SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - SEPTEMBER 1984

Status of Publications

Published

Myrick, A.C., Jr. 1984. Time significance of layering in some mammalian hard tissues and its application in population studies. Acta Zool. Fennica 171:217-220.

Daily layers accumulate in prenatal enamel of teeth in many cetacean and sirenian species. Lunar monthly layers (LMLs) occur in prenatal dentine. Both systems provide a potential means of estimating fetal growth rates and lengths of gestation. For these species, postnatal dentine and periosteal bone contain LMLs. LML counts increase the precision in determinig ages and age-specific vital rates. When dates of death are known, LMLs may be used to determine birth months and reproductive patterns in a sampled population. If breeding is limited to a short period, LMLs may be used to determine the approximate months of death. The hard tissues in many terrestrial mammals appear to contain subyearly layering patterns which may be the same as those found in sirenians and cetaceans. Investigations of these patterns could result in more accurate definitions of age-related biological parameters for terrestrial mammal populations.

Sen, A.R. 1984. Sampling commercial rockfish landings in California. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC-45, 95 p.

Administrative Reports

Mendelsohn, R.O. 1984. The benefits of preserving endangered species: with special attention to the humpback whale. SWFC Admin. Rep. H-84-14.

Whipple, Jeannette A. 1984. The impact of estuarine degradation and chronic pollution on populations of anadromous striped bass (Morone saxatilis) in the San Francisco Bay-Delta, California. A summary for managers and regulators. SWFC Admin. Rep. T-84-01.

THIS REPORT DOES NOT CONSTITUTE PUBLICATION AND IS FOR INFORMATION ONLY.

Approved for Publication by Center Director

Bartoo, Norman and Toshio Shiohama. A production model analysis of the North Pacific albacore population including estimates of the sensitivity of results to measurement errors in input data. For publication in the Bulletin of the Far Seas Fisheries.

Boehlert, G.W., and M.P. Seki. Enhanced micronekton abundance over mid-Pacific seamounts. EOS 1984 Fall Meeting (AGU/ASLO).

Genin, A., G.W. Boehlert, and P.F. Lonsdale. Initial studies in seamount ecology. EOS 1984 Fall Meeting (AGU/ASLO).

Perrin, William F. The former dolphin fishery at St. Helena. For publication in the International Whaling Commission series.

Pitman, Robert L. and Terence R. Wahl. The occurrence of Solander's petrel and Murphy's petrel in the eastern North Pacific. For consideration for publication in Western Birds.

Ralston, S. A novel approach to aging tropical fish. ICLARM Fishbyte.

HONOLULU LABORATORY
Honolulu, Hawaii

Insular Resources Investigation

Ocean Thermal Energy Conversion Research Continues

Dr. George W. Boehlert, Chief, Insular Resources Investigation, reports that research continued at the Kewalo Research Facility to determine the effects of thermal shock associated with projects for proposed ocean thermal energy conversion development. Thomas K. Kazama, Fishery Biologist, and research assistant Yara Lamadrid-Rose continued efforts to obtain new brood stock of mahimahi, Coryphaena hippurus. Several species of reef fishes have been collected to test as potential subjects for thermal effects on juvenile fishes. Preliminary experiments with the goldspot herring, Herklotsichthys quadrimaculatus, suggest that cold shock results in behavioral changes such as rapid swimming and collision with tank walls. Similar behavior is exhibited when juveniles are transferred back to ambient water.

Training Course Presented to U.S. Coast Guard Personnel

Research assistants Michael P. Seki and Robert L. Humphreys, Jr., and Eugene Witham, Senior Resident Agent of the NMFS Southwest Region's Law Enforcement Branch in Honolulu, conducted a short course on federal fishery regulations and identification of related fish and invertebrate species for personnel from the U.S. Coast Guard cutter Jarvis. The fishery management plans for precious corals, seamount ground fishes, spiny lobsters, and billfishes and sharks were discussed. Distinctive characteristics of the major species involved were described, including tunas and squid which are not regulated in the U.S. 200-mile Fishery Conservation Zone when fishing with certain gear such as pole-and-line and squid jigging machines.

Fishery Management Research Program

Fishery Council's Research Interests Summarized and Discussed

At the request of Laboratory Director Richard S. Shomura, Dr. Robert A. Skillman, Leader, Fishery Management Research Program, prepared a summary of the research interests developed recently by the Western Pacific Regional Fishery Management Council (Council). These interests involve spiny and slipper lobsters, deep-sea shrimp resources, bottom fishes, and seamount resources. The summary of the Council's research interests will be considered in planning the use of research vessel and personnel resources by the Honolulu Laboratory for fiscal year 1985.

Because of the increasing importance of slipper lobster in the catches of the spiny lobster fishery in the Northwestern Hawaiian Islands and the

interest the Council has shown in slipper lobster, Dr. Skillman held an informal meeting with Honolulu Laboratory and State of Hawaii researchers and Council staff members to discuss research needs in the spiny lobster fishery. Among the topics discussed were species identification, size at first maturity, fecundity, seasonality of spawning, morphometrics, and distribution of species resources.

Size at Maturity Studies Continue

Research assistant Alan R. Everson is continuing to collect samples of uku, Aprion virescens, for a study on size at maturity and fecundity of this species and onaga, Etelis coruscans. Everson reports that samples are being collected in the size range where first maturity is expected, and preparation of gonad samples for histological examination has begun.

* * * * * * * * * *

Research assistant Bert S. Kikkawa completed the revisions of his report on the Hawaiian skipjack tuna, Katsuwonus pelamis, fishery. He also spent most of the month contacting key people responsible for conducting the major Hawaiian fishing tournaments regarding the collection of data from the recreational fisheries. Thus far, the results have been good in obtaining cooperation from the recreational fishermen.

Research assistant Victor A. Honda completed a draft of his manuscript on the Hawaiian longline fishery.

* * * * * * * * * *

Samuel G. Pooley, Industry Economist, continued (1) preparation of a paper for the forthcoming meeting of the Western Association for the Valuation of Ecosystems, (2) statistical analysis, with the aid of research assistant Wesley K. Higuchi, for a paper on price responsiveness in fresh fish transactions in Hawaii, (3) updating socio-economic data file with the help of Higuchi and research assistant Nathaniel T. Shippen, and (4) preparation for the fielding of the Hawaii Recreational Fishing Valuation Economic Survey.

Pelagic Resources Investigation

Tuna Tracking Data Analyzed

Randolph K.C. Chang, Acting Leader, Experimental Ecology of Tunas Program, reports that he worked on refining plotting and analysis techniques for tuna tracking data. Chang completed plots of the vertical movements of all fish tracked so far in 6- and 24-h formats.

Chang also reports that cooperating scientist Dr. Kim Holland of the Hawaii Institute of Marine Biology (HIMB), University of Hawaii (UH), began work on a manuscript detailing the technique of using a small vessel in a nearshore tuna tracking project. Holland also submitted a final proposal to the UH Sea Grant Program to expand the scope of the tracking project in 1985 to 1987.

Chang and Holland also conducted odor tests on the Laboratory's research vessel, Kaahele'ale. The work is designed to measure rates of odor release through various hose dispersal systems. Small odor-release systems are being tested for possible use by fishermen in the tuna handline and ikashibi fisheries.

* * * * * * * * * * *

Lt. (jg) Jeffrey A. Koch, NOAA Corps, joined the staff of the Experimental Ecology of Tunas Program. Koch fills the position vacated by Lt. (jg) J. Scott Ferguson, NOAA Corps, who was reassigned to a new position in July.

Draft of Paper for Marine Debris Workshop Completed

Richard N. Uchida, Acting Chief, Pelagic Resources Investigation, completed the first draft of a paper which reviews the major net fisheries in the North Pacific. The paper, which was prepared for presentation at the workshop on "Fate and Impact of Marine Debris," provides crude estimates of the amount of net gear available to the various coastal and high seas fisheries. Specifications (when available) of gill nets, purse seines, trawls, set nets, haul seines, and lift nets are provided together with the number of units of nets and vessels operating in the fisheries.

* * * * * * * * * * *

Uchida reports that of the 13 papers presented at the "Workshop on the Environment and Resources of Seamounts in the North Pacific" held at Shimizu, Japan, in March 1984, 11 have been reviewed and revised. Uchida also worked with James H. Uchiyama, Fishery Biologist, on minor revisions of the "Fishery Atlas of the Northwestern Hawaiian Islands."

COASTAL FISHERIES RESOURCES DIVISION
La Jolla, California

Coastal Eastern Pacific Population Biology of Fishes

Predation on Anchovy Larvae Studied

Arild Folkvord, graduate student at the Scripps Institution of Oceanography who has been working under Dr. John Hunter's supervision, has completed a laboratory study on the size specific vulnerability of northern anchovy larvae to predation by fishes.

During the laboratory study, he recorded visual observations on the response and escape probabilities of larval anchovy to attacking predators. The larval anchovy and predators were placed in 1.5 m^3 tanks. Larval groups ranging in length from 6 mm to 35 mm SL were tested using 8 cm juvenile northern anchovy and 18 cm chub mackerel (Scomber japonicus) as predators.

The proportion of larvae responding to predator attack increased with larval size. Fifteen percent of the larvae responded to an attack when the larvae reached 35 mm SL. The proportion of larvae responding to an attack was about the same regardless of predator used. The proportion of larvae escaping an attack also increased with larval size with the fraction escaping the anchovy predators increasing from 8% in 6 mm larvae to 90% in 35 mm larvae. More larvae of all sizes escaped the attacks of juvenile anchovy than the attacks of mackerel. The difference between predators was the most marked at the larger larval size classes.

The highest rate of consumption of larval anchovy (numbers consumed/5 min) occurred when the larvae were 12-15 mm long. This may be the result of the combined effect of the relatively greater visibility of larvae at this size, compared with smaller sizes, and their lack of adequate sensory and locomotory abilities.

This study is the first step in the development of a size specific predation model for anchovy larvae. When this research is completed it will be useful for interpreting patterns in the natural mortality of anchovy larvae and ultimately recruitment.

Japanese Scientist Begins Cooperative Study at the Center

Dr. John Hunter reports that Dr. Shuhei Matsuura, Department of Fisheries, Faculty of Agriculture, Kyushu University has arrived from Japan, and will be at the Southwest Fisheries Center until June 1985. He will be working with Hunter and histologist Beverly Macewicz on a research project whose objectives are to determine how fecundity is affected by the atretic state of the ovary in the anchovy. A common presumption is that the batch fecundity of females with atretic oocytes in their ovaries is lower than that of fishes having no atretic oocytes in the ovary. The work Matsuura will conduct is to test that assumption.

Serological Assay Techniques Investigated for Elucidating Predator-Prey Relationships in Ocean

To understand predator-prey relationships in the ocean, predators need to be identified. Predation on larval fish may be a major cause of larval fish mortality, but the evidence is not conclusive. Predator-prey relationships remain obscure in many situations where predator gut contents cannot be identified through visual analyses.

Gail Theilacker, Fishery Biologist, and biological technician Amy Kimball spent the past summer testing the feasibility and sensitivity of serological assay techniques, which they plan to use to determine whether the ubiquitous euphausiid crustaceans eat anchovy eggs and larvae in the ocean. Earlier laboratory experiments showed that Euphausia pacifica adults will eat 10 to 20 anchovy larvae a day even when alternative prey are available. A "day" in this context is equal to 10 hours, the interval when euphausiids and anchovy eggs and larvae occur together in the upper 50 meters of the ocean.

Both serological precipitation and agglutination reactions have been applied to predator-prey studies (Boreham and Ohiagu 1978; Feller et al. 1979) but these tests require large quantities of the unknown samples and large serum volumes. In addition, these tests are time consuming, i.e., few predators can be tested in a day. After testing many assays, Theilacker and Kimball found that an enzyme-linked immunosorbent assay (ELISA) was the procedure that was most effectively applied to systems where many small samples are being examined for presence of a specific prey item.

Rabbits were immunized with anchovy yolk protein that was separated from egg membranes and vacuoles and combined with Freunds complete adjuvant prior to injection. Polyclonal antibodies were used to increase the likelihood of antibody binding to prey proteins, which may be partially degraded due to euphausiid proteolytic activity. Composition of the yolk preparation and similar preparations of developing anchovy eggs and larvae (days 1 to 6) were examined using SDS polyacrilamide electrophoresis. The gel revealed the presence of seven major yolk proteins which are not present in post yolk-sac larvae. A western blot was used to transfer protein bands from the gel matrix onto nitrocellulose paper, which was then subjected to the ELISA procedure. Three yolk bands were reactive with the antisera.

Preliminary results show that the antisera from the first inoculation (antisera resulting from the booster will be collected this month) has a titre of 1:500; it does not react with extracts of euphausiids (soybean trypsin inhibitor and bovine serum albumin are both present in the extraction buffer), anchovy muscle protein, sea urchin eggs, or white seabass eggs. Thus it appears to be specific. Using the ELISA, 1 μg of yolk protein can be detected in the presence of euphausiid extract. One anchovy egg weighs 21 μg.

The procedure will be tested using euphausiids that have been fed anchovy larvae in the laboratory.

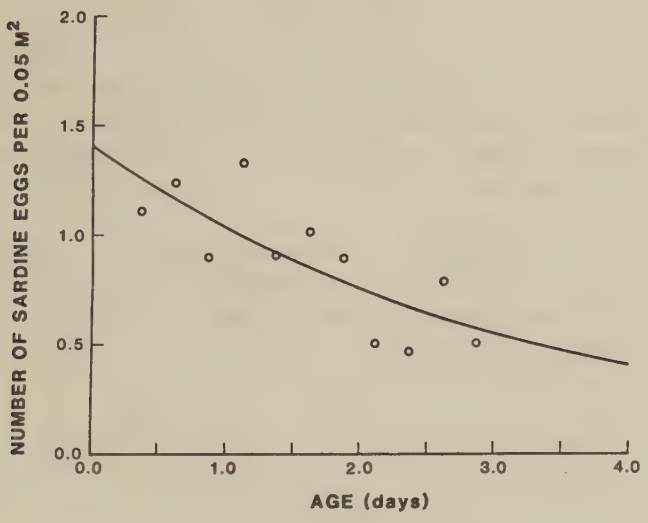
Is the Pacific Sardine Back?

California Fish and Game Biologist Pat Wolf and Dr. Paul E. Smith of the Coastal Fisheries Resources Division have devised monitoring procedures for objectively determining that a fishable sardine stock exists in the waters off California. The California Current region is normally the home of a 3 million-ton sardine population. Large fluctuations were normal, however; before there was a fishery and the pelagic fishery, once the largest off North America, apparently augmented the natural declines in stock size in 1947 and 1963. California legislators in the early 1970s set a moratorium on the fishery to be applied whenever the stock fell below 20,000 tons spawning biomass; a small fishery of 1,000 tons per year was to be allowed if the stock exceeded 20,000 tons. The sardine stock has been considered to be below 20,000 tons since the middle 1960s.

Recent signs of increase in the sardine stock have not been quantified. If the approach of sardine fishery management is anticipated, robust methods of estimating the spawning biomass should be considered. Wolf and Smith considered three methods of estimation: 1) inverse egg production, 2) larval census, and 3) aerial survey. The aerial survey method assembles data on commercial fish spotter volunteers and special flight logs to estimate the area of ocean observed and the sardine tonnage per unit area to estimate stock size. The larval census uses a correlation between the stock size estimated from the sequential solution of catch equations and the abundance of sardine larvae in the 1951-1965 base period. The inverse egg production method is a novel approach derived from the egg production method currently used for the Peruvian anchoveta and northern anchovy.

The egg production method estimates the spawning biomass from 1) the size of the spawning area, 2) the production of eggs per unit sea surface, and 3) the production of eggs per unit weight of fish. The inverse egg production method attempts a probability statement on the proposition that 20,000 tons of spawning biomass exist. Since most of the reproductive parameters of the sardine population are known, the few unknown parameters can be approximated through a probable range to design a survey to establish the basis for the institution of a commercial, directed fishery. The trial population parameters were 120 grams for the weight of an average female, .5 for the sex ratio by weight, and 32,000 eggs per batch for fecundity. The mean interval between batches was varied between 6 days and 50 days; the egg production per unit habitat was 5 and 1.5. The former estimate assumes that the ratio between sardine egg production is half the anchovy egg production as it was in Peru in 1981. The latter egg production rate is estimated from the 1951 to 1959 aged sardine egg samples from the California Current data base (Figure 1). Given these parameter sets, it is necessary to find sardine egg production over an area of 140 to 2,500 square nautical miles. Given the historical spawning center off southern California and main spawning month of May, Wolf and Smith drew up plans of a vertical egg net survey of approximately 30 samples per day for 10 days. A full report on this will be delivered at the 1984 CalCOFI Conference and subsequently to the administrator of the Southwest Fisheries

Center in La Jolla and the California Department of Fish and Game in Long Beach.



Survey Systems Development and Evaluation

Scripps Pier Temperatures Reviewed and Summarized

Oceanographer Larry Eber has fitted harmonic coefficients to the Scripps Pier Temperature annual cycle so that the mean temperature can be determined for any day of the year to estimate the anomaly in any given year. The equation is the same one used for all standard depths on all standard stations in the CalCOFI area. The equation is:

$$Temp = (A1 * \cos\Theta)+(B1 * \sin\Theta)+(A2 * \cos(2\Theta))+(B2 * \sin(2\Theta))+(C)$$

where Temp is the average temperature on a particular day, and Theta - is the day of the year converted to an angular expression by the equation:

$$Theta = day * 360/365$$

The constant C in this equation is the annual average temperature at Scripps Pier.

For the 68-year period of the temperature monitoring at Scripps Pier (1916-1984) the constants are:

C	A1	B1	A2	B2
16.899	-2.519	-1.962	0.029	0.352

For the 29-year period for which CalCOFI oceanographic data are available (1950-1978) the Scripps Pier constants are:

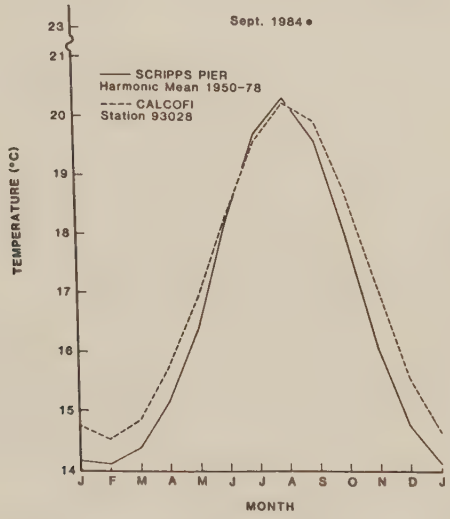
16.777	-2.357	-2.037	-0.010	0.442

For the two closest CalCOFI oceanographic stations, 6 and 14 miles off Del Mar (93.28 and 93.30), the constants are:

17.235	-1.997	-2.065	-0.130	0.159
17.443	-1.990	-2.406	-0.243	0.313

For the Scripps Pier 1950-1978 series, the month of maximum temperature is August (20.3°C or 69°F) and the month of minimum temperature is February (14.1°C or 58°F). The seasons of maximum difference between the Scripps Pier and the CalCOFI station off Del Mar are November when the Scripps Pier is 1°C cooler and July when the Scripps Pier is 0.1°C warmer.

A draft report of the Scripps Pier monthly sea temperature averages and some statistical properties of the temperature are available at SWFC. The September 1984 Scripps Pier sea temperature was 23.1°C (74°F) or nearly 4°C (7°F) above the long-term average for September (Figure 1).



Commercial and Recreational Fisheries Research for Management

Side-Scan Sonar Ordered

Precise and efficient trawl surveys of pelagic fish require some prior knowledge of the distribution of the fish. Side-scan sonar can be used to map the relative abundance of fish schools. The resulting trawl samples can then be allocated to the areas with high concentrations of fish.

Drs. Richard Methot, Paul Smith and Jay Barlow have designed a side-scan unit which can be used for this purpose. The unit consists of two transducers which operate at 38 and 120 kHz respectively, a stainless steel and plastic housing for the transducers, and an electromechanical cable for towing the unit at up to 8 knots. A contractor has been selected to manufacture and assemble the unit, and delivery is expected by winter, 1985. The first major sea trials of the side-scan sonar are scheduled for May 1985 on the NOAA Ship David Starr Jordan.

Analysis of Trawl Surveys Underway

Dr. Richard Methot, Fishery Biologist, is attempting to reconstruct a time series of anchovy age composition from the trawl surveys conducted by biologist Ken Mais of the California Department of Fish and Game. The

database now consists of 103 trawl/acoustic surveys conducted during the period 1966-1983. The sample protocol at sea has been to select 25 fish for size determination (if at least 25 fish were captured) and then to determine the ages of 10 of these fish. Previous analyses of mortality and growth of anchovy have been based on the age and size distributions of the fish which had been aged. These analyses have indicated that the young fish are underrepresented in the aged database. Methot has identified three factors which contribute to this bias in the aged fish database.

Acoustic data collected during the day on these cruises have been used to decide where to trawl at night. This procedure helps assure that each trawl will catch some fish, but does not truly allocate the number of trawls according to the relative abundance of fish in a region. Operationally, trawls cannot be allocated in proportion to relative abundance, so corrections must be made in the analysis. Methot has found that regions with a high mean catch rate tend to have younger fish. Therefore, a less biased estimate of the overall age composition can be made by determining the age composition within each of several regions, which are recombined by using the product of mean catch rate and region area as weighting factors.

Trawl catch rates vary by several orders of magnitude, but only a fixed number of fish are processed from each sample. However, among the trawls within each region high catch rates tend to be associated with young fish, and therefore the age compositions based on the fixed subsample size are biased against the young fish. Operationally, it is not possible to subsample a fixed fraction of each catch, so this bias also must be accounted for in the post-cruise data analysis. Methot is now investigating several functions of trawl catch rate to use as trawl weighting factors.

A third bias occurs only in the early years of the survey. Occasionally a trawl catch contained only small fish which obviously were of the youngest age class. These fish were not actually aged, so they did not enter the aged database. This factor biases the age composition and mean size at age estimates for those early cruises, but is easily accounted for by comparing the size distributions of a trawl catch with the size/age distribution of all catches in that region.

Final versions of all analyses are not yet complete, but preliminary indications are that processing the age composition approximately doubles the estimated proportion of fish in the youngest age class. All analyses are now being done in FORTRAN on a La Jolla Standard microcomputer. A reformatted version of the entire database occupies 2/3 of the available space on one microcomputer floppy disk.

Management Information Document for Coastal Pelagic Fishes is Completed

A "Management Information Document (MID) for California Coastal Pelagic Fishes" was completed at the end of the month. The document was prepared and edited by fishery biologist Alec MacCall, and includes major contributions by Jay Ginter of the Southwest Region and Dan Huppert, Alec MacCall, Richard Methot and Cynthia Thomson of the SWFC. The document

summarizes biological, economic, regulatory and other information relevant to management of six southern California coastal pelagic species. These species are northern anchovy, Pacific sardine, Pacific mackerel, jack mackerel, Pacific bonito and market squid. This information was compiled at the request of the SWR, which wanted a convenient synopsis of information useful for expediting management actions such as responding to foreign or joint venture fishing applications. The document is also intended to be a basis for long-range planning of management and associated research.

Biological synopses for each species include stock structure, vital statistics (e.g., growth and mortality), maximum sustainable yield, and estimates of virgin stock size. The MID describes the fisheries exploiting these species, including recreational and bait uses. From a multi-species, ecosystem viewpoint, the document provides review of existing knowledge of qualitative and quantitative relationships among these species and others. Marine mammals, seabirds, and large fishes clearly rely on many of these coastal pelagic species, especially anchovy, for forage. While some interactions are logically expected, present knowledge is not sufficiently quantitative to allow these interactions to be the biological basis for multi-species management models.

Economic descriptions of the industries include the southern area (San Pedro) and northern area (Monterey) commercial fleets, processors, the live bait fleet, and the recreational fisheries. While the live bait fleet has steadily harvested anchovies, the other fisheries have experienced large fluctuations in the composition of species harvested, with accompanying fluctuations in value. Pacific mackerel, which recently recovered from a severely depleted state, is now the mainstay of the southern area commercial fleet, and the most common pelagic fish caught by recreational fishermen. Low prices for fish meal have resulted in a near cessation of the domestic anchovy reduction fishery, although the Mexican fishery has been active; these conditions appear unlikely to change in the near future. There is an economic rationale for a flexible multi-species management system, but again, lack of quantitative, bio-economic, multi-species models limits the ability to investigate or implement such approaches.

The document contains an extensive review of current state and federal regulations affecting these fisheries. The review covers the various fisheries, as well as general and species-specific regulations on catch, size, area, time, gear, access, and reporting. It appears on review that there is a surprising complexity of existing regulations governing these fisheries.

Management considerations are addressed in the final chapter. For some species, such as jack mackerel and squid, there is presently no need for harvest controls. Due to the decline of domestic interest in anchovy reduction, there may be less need for close monitoring of that resource. Conversely, intense interest in sardine abundance indicates a need for closer monitoring of those species. An examination of alternative harvest formulas for Pacific mackerel suggests that there would be little gain in changing the present harvest formula. Bonito appear to be managed appropriately with recent implementation of a minimum size limit. The only

multi-species management that presently appears justified is coordination of fishing seasons, and that coordination has already been accomplished by an evolutionary process of regulatory modifications.

SWFC Economist Analyzes New England Fisheries

Dale Squires, Industry Economist, who joined the staff in September, completed his Ph.D. in Resource Economics at Cornell University. For his dissertation, he analyzed the effects of production relationships among otter trawls for public regulation in the New England groundfish industry. A concurrent study was conducted on the scallop industry. Five papers have been generated from these studies, four of which are in the final stage of preparation, and the fifth is currently under review.

OCEANIC FISHERIES RESOURCES DIVISION
La Jolla, California

Tuna Assessment Investigations

Results Reported for the 1984 Billfish Tagging Program

As of October, 148 striped marlin had been tagged and released by marine anglers off the southern California coast line during 1984. This number is below the total for the El Niño year of 1983, but much higher than in previous years. These higher numbers are mainly the result of support given the billfish tagging program by the National Coalition of Marine Conservation.

Marine Mammal Assessment Investigations

Harbor Porpoise Surveyed Aboard NOAA Ship Jordan

Dr. Jay Barlow, Aleta Hohn and Susan Chivers, SWFC, were among the participants on the first, recently completed NMFS ship survey of harbor porpoise (Phocoena phocoena). Barlow was cruise leader for the survey, which was conducted September 4-15 aboard the NOAA Ship David Starr Jordan. The survey covered the coast line from Point Conception, California, to Cape Flattery, Washington. Harbor porpoise inhabit a relatively narrow coastal strip from Point Conception to Alaska. Given their near-shore distribution, harbor porpoise are particularly susceptible to coastal gill nets, which are now common between Monterey Bay and San Francisco. Results of previous surveys using aircraft suggested that the majority of harbor porpoise stay within a quarter of a mile of the shoreline. The Jordan survey was designed to determine 1) the north/south distribution of harbor porpoise; 2) the inshore/offshore distribution of harbor porpoise; and 3) the suitability of Jordan-class vessels for harbor porpoise surveys.

The harbor porpoise survey was a collaborative effort. In addition to SWFC staff, personnel included Michael Scott of the Inter-American Tropical Tuna Commission, Barbara Taylor and Sally Mizroch, both from the National Marine Mammal Lab, NOAA, Seattle, Washington. Volunteer help was provided by three experts on harbor porpoise surveys: Andy Reed, University of Guelph, Marc Weber, Oceanic Society, San Francisco, and Isidore Szczepaniak, California Academy of Sciences, San Francisco. The ship survey was coordinated with simultaneous aerial and ground counts of harbor porpoise in a program conducted by Lt. Commander Terry Jackson, NOAA Corps stationed at the SWFC.

Harbor porpoise are difficult to sight because they are so small (approximately 1-1/2 meters), occur in small groups (typically 1-5), and seldom splash or jump at the surface. For this reason, the usual cetacean survey methods were modified slightly for the Jordan cruise. In addition to the usual two observers and a recorder, two more observers were added. One pair of observers used 25-power binoculars, and the other pair used 7-power binoculars. The 9 people in the scientific party switched between

these 5 positions at regular intervals. Effort was maintained at this level from dawn to dusk, unless fog obscured visibility or unless the winds raised the sea state to 6 or greater on the Beaufort scale.

Preliminary results from the cruise indicate that the Jordan can be used effectively to survey harbor porpoise; a total of 302 groups of harbor porpoise were seen. The ship traveled within a mile of the coast, and the number of sightings on each side of the ship were tallied to determine how rapidly the abundance of harbor porpoise decreased with distance from shore. A total of 139 sightings were made on the inshore side, 142 on the offshore side, and 20 dead center on the trackline of the vessel. These results show no evidence of a very steep inshore/offshore gradient in abundance that was predicted from previous work. Additional information on inshore/offshore gradients will be required before information from this cruise can be used to calculate the abundance of harbor porpoise.

One problem identified during the survey is that harbor porpoise react very strongly to the presence of a ship. When the ship was heading north, the predominant direction harbor porpoise were traveling was south (68 out of a sample of 80). After the ship turned at Cape Flattery and headed south, the predominant direction of harbor porpoise travel was north (81 out of a sample of 136). This information indicates that harbor porpoise react to the presence of a ship before they are sighted. This avoidance of survey vessels will tend to bias estimates of harbor porpoise abundance. Future harbor porpoise surveys are planned to investigate further questions of inshore/offshore distribution and to answer questions of how avoidance may bias census results.

Ecological Fishery Systems Investigations

Performance of the U.S. Tuna Industry Reviewed

"The 1983 U.S. Tuna Trade Summary" is the title of a recently published Southwest Region Administrative Report by Sam Herrick, Industry Economist, Southwest Fisheries Center, and Steve Koplin, Fishery Reporting Specialist for the Statistics and Market News Service, NMFS Southwest Region.

In this publication, the authors provided information on the structure and operations of the U.S. albacore and tropical tuna fleets, volumes and corresponding values of domestically caught and imported raw tuna cannery receipts, volume and corresponding value of domestic light and white meat tuna production, imports of canned tuna, and canned tuna consumption. Data for 1983 are compared with those for 1982 and earlier years. Events that influenced 1983 conditions and changes from years earlier are discussed.

Between 1982 and 1983 total U.S. tuna cannery receipts increased 6%, the total U.S. canned tuna pack increased 5%, and U.S. consumption of canned tuna increased 11% on a per capita basis. However, improvement in these areas was not realized without some significant changes in the industry's structure and operations.

During 1983 at least 60 of the 127 purse seiners comprising the U.S. tropical tuna fleet operated in the western Pacific. The U.S. seiners operating in this area were quite successful, with regard to volume of catch, and for the first time, cannery receipts of domestically caught tuna from this area accounted for the greatest share of domestically caught receipts by oceanic region: 173,153 short tons, 60% of the total domestically caught cannery receipts for 1983. Nevertheless a significant portion, approximately 25% of the U.S. tuna fleet was inactive for all or part of 1983 for economic reasons.

Most of the domestically caught tuna from the western Pacific, more than 75%, was delivered to off-shore canneries located in American Samoa, Hawaii and Puerto Rico. Off-shore processing became more prevalent during 1983. Approximately 63% of the total U.S. pack of canned tuna was processed at off-shore facilities in 1983 compared to 61% in 1982, and 58% in 1981. As a result of this continuing shift in canned production to off-shore sites, employment at California canneries, which fell sharply in 1982, is reported to have decreased further during 1983 by the equivalent of nearly 1,250 full-time jobs.

U.S. processors continued to face stiff competition from imports of canned tuna during 1983. Total imports of canned tuna not in oil amounted to a record 122,329 thousand pounds or almost 6.3 million cases, an increase of 40% from 1982. Imports of canned tuna in oil, which are subject to a substantially higher tariff than canned tuna not in oil, were negligible in 1983.

Thailand was the leading exporter of canned tuna to the U.S. in 1983 with approximately 2.0 million cases, 33% of the total U.S. imports of canned tuna. The Philippines followed with 1.6 million cases representing 26% of the total 1983 canned imports.

Interactive Cohort Analysis Program Developed

An interactive cohort analysis program with enhanced graphic display of results was developed by fishery biologist Pierre Kleiber on a portable microcomputer for use at a July workshop sponsored by the International Commission for the Conservation of Atlantic Tuna (ICCAT). Subsequently, Kleiber has adapted the computer program to the capabilities of a more powerful microcomputer. The program does simple cohort analysis of a single age class, but it features a modular structure that allows the fundamental parts to be embedded in programs for carrying out more complex cohort analyses.

Biological Fisheries Systems Investigations

Proposal Made to Develop Methods for Indexing Estimates of Natural Mortality in Exploited Tuna Stocks

A multidisciplinary team of scientists from the Southwest Fisheries Center and the Inter-American Tropical Tuna Commission (IATTC) has completed a proposal for a pilot study directed toward improving the predictive capability of tuna assessment models, by developing methods to index estimates of natural mortality in exploited stocks. Southwest Fisheries Center personnel includes Drs. Elizabeth Vetter, Christofer

Boggs, Andrew Dizon and Norman Bartoo; the team also includes Robert Olson from the IATTC. Initially, the group will concentrate on developing a variable (indexed) mortality schedule for different sizes of commercially exploited tunas. This variable will be used to quantitatively shape (index) the natural mortality vector. This is a more appropriate formulation than the formulation used in current models, which assumes a constant and equal natural mortality for individuals in all categories.

A priori simulation will be conducted to determine the sensitivity of yield-per-recruit and cohort analysis models to variable schedules of natural mortality. Experimental physiological studies will provide the basis for a Risk Index relating physiological status to a probability of succumbing to natural mortality. The team will develop quantitative methodology to map physiological information into the Risk Index, and subsequently into the fishery models. Field validation and sampling studies will accompany the physiological studies.

The integrated project is specifically directed toward developing better predictive capability for fishery management by drawing on the expertise of complementary specialists, with a plan, a priori for incorporating the data into existing and new or refined predictive tuna models.

Mitochondrial DNA Purified from Frozen Albacore Samples

Intact mitochondrial DNA (mtDNA) has been isolated from albacore tissue samples collected on the recent David Starr Jordan albacore cruise by biological technician Hannah Bernard. A new approach to treating and preserving the tissue samples, developed by oceanographer Dr. John Graves, proved highly successful in preventing the degradation of the labile fish mtDNA molecule. In the procedure, heart and gonad tissues were dissected from freshly caught albacore, rinsed in a solution to prevent osmotic and freezing shock and, to inhibit nuclease (DNA degrading enzyme) activity, frozen in liquid nitrogen and stored at -70°C in a biological freezer or in the liquid nitrogen.

The 20 albacore samples obtained on the recent cruise will be analyzed for intrapopulation variability and will be compared with albacore from other ocean basins as those samples become available.

Multispecies Data Management and Fisheries Monitoring Program

Marine Bird Density Plots Created

Biologist Robert L. Pitman has collected data pertaining to the distribution and density of marine birds in the eastern tropical Pacific (ETP) during the past 10 years. This information is now stored in a database maintained at the SWFC. One of the major purposes for collecting these data was to compile an atlas of a series of geographical plots showing the distribution and relative density of most species of birds occurring in the ETP. In the process other reports have been produced, including summaries of each cruise showing such items as dates of the

cruise, number of days and hours of observational effort and number of bird species seen; and reports of sightings of rare birds in the study area.

During the past year, computer procedures to create plots and reports were developed, principally by programmer analyst Ken Wallace and programmer Lily Tang. Programmer analyst Eugene Sibbald and programmers Joe Joy and Joel Strickland assisted. The plotting procedure required writing a new data-preparation program and extensively modifying an existing system of plotting programs. The resulting plots show shaded 1° squares that represent the bird density expressed in number of birds sighted per hour of acceptable observational effort. Although data is displayed by 1° square, an algorithm was developed to smooth data over the nearest 2° square. The plots also indicate areas that were searched but had no observations of the species of interest. Individual plots were generated for 78 species and species combinations. Additional plots were created showing the amount of observational effort in each 1° square.

Report Summarizes Results of the 1983 Puerto Rico Sampling Program

Al Coan, Leader of the Multispecies Data Management and Fishery Monitoring Program, reports that former employee Tod Foster and biological technician Eugene Holzapfel completed an Administrative Report titled, "Size and Species Compositions of Atlantic Tunas from Imports Landed in Puerto Rico During 1983" (LJ-84-25). The report summarizes the results of the sampling of more than 9,700 yellowfin, skipjack, bigeye, albacore, bullet and blackfin tunas for size and species composition in 1983. When compared with samples taken in 1982, the results show that the average length of fish in the imported catches went up 5 cm for yellowfin and albacore, decreased 4 cm for bigeye tuna, and remained the same for skipjack tuna. The percentage of fish in import catches that were less than the minimum size limit (55 cm) for both yellowfin and bigeye tunas was 55%, a decrease of 13% and 1% respectively over percentages in samples collected from the 1982 catches.

Status of 1984 Tuna/Dolphin Observer Data Reported

Biological technician Al Jackson reports that four tuna/dolphin observers departed in September on cruises aboard commercial tuna seiners fishing in the eastern tropical Pacific. One of these observers was sent to collect data for the NMFS; the other three were sent to collect data under the direction of the Inter-American Tropical Tuna Commission (IATTC). One NMFS cruise was completed this month. Data from two cruises were added to the 1984 tuna/dolphin data bases. The table below summarizes the status of data collected this year by NMFS tuna/dolphin observers:

Cruise number	Vessel depart	Vessel return	Data received	Data edited	Database loaded
884	4-19-84	6-13-84	6-22-84	7-31-84	9-24-84

887	5-09-84	7-28-84	8-13-84		
888	5-10-84	7-23-84	8-08-84		
889	5-10-84	6-25-84	7-06-84	7-27-84	9-24-84
890	6-04-84	8-22-84	8-31-84		
891	6-26-84				
892	8-03-84	9-19-84	9-28-84		
899	9-22-84				
TOTAL 8	8	6	6	2	2

PACIFIC ENVIRONMENTAL GROUP
Monterey, California

Diagnostic Studies Undertaken of Anomalies Associated with 1982-1983 Tropical El Niño

Oceanographers Douglas McLain, Lt. (jg) Russell Brainard, David Husby and Jerry Norton have undertaken a diagnostic analysis of events associated with the 1982-1983 tropical El Niño as they expressed in the eastern boundary current systems of the Altantic and Pacific. The term "El Niño" originally referred to sea surface warming that occurred in the eastern equatorial Pacific off the coasts of Peru and Ecuador. Since this warming commonly occurred during the Christmas season, it was given the name, "El Niño", which refers to the Christ Child. The tropical El Niño is now recognized as a global ocean-atmosphere phenomena which frequently has recognizable effects throughout the world. The 1982-1983 tropical El Niño was accompanied by global weather disturbances, such as an unusually severe winter in California and drought in Australia and central Africa. Although the extreme effects of the 1982-1983 global event appear to be diminishing, related conditions linger in many areas and secondary biological and economic consequences are likely to last for decades. During the 1972 El Niño event, for instance, the massive Peruvian anchoveta fishery collapsed and has not recovered to the present day.

Since one of the most obvious features of El Niño is elevated temperature in the ocean's surface layers, ocean temperature fields at the surface and at 100 and 200 meters are being investigated. Other parameters examined were coastal sea level, upwelling index and salinity. The studies have developed in two directions. First, there has been emphasis on coastal warming events that have occurred off the coast of California and Baja California. These events are called "California El Niños" because of their synchronism with tropical El Niños. The second objective is to compare the characteristics of the global event in Atlantic and Pacific eastern ocean boundary current systems. Results of the first study, "The 1982-83 El Niño event off Baja and Alta California", were presented by Norton at a meeting on El Niño effects in the eastern subarctic Pacific at the Pacific Marine Environmental Laboratory, Seattle, Washington, on September 12. This meeting was sponsored by the International Recruitment Investigations in the Subarctic (IRIS). McLain will present results of the second study comparing responses of eastern boundary currents at the California Cooperative Oceanic Fisheries Investigations (CalCOFI) Conference in Idyllwild, California, on October 30.

Reports of sea surface temperatures greater than 4°C above normal were reported by many observers along the California Coast. The present study, however, which considered monthly averaged temperatures over 300 by 300 kilometer squares, found the most extreme anomalies (on this larger scale) to be less than +2.7°C. These occurred at 100 meters depth. Anomalies at

the surface and 200 meters were generally less than +1.7°C. These anomalies were large enough to mark the 1982-1983 California El Niño clearly as the most extreme of this decade. Since related warming effects have been observed over a two-year period, from the fall of 1982 to the present, it is also extreme in terms of duration.

The last California El Niño of comparable intensity and duration occurred in the 1957-1958 period. Both 1957-1958 and 1982-1983 El Niños were accompanied by atmospheric adjustments to sea surface warming in the equatorial Pacific. These atmospheric adjustments result in unusually strong winds from the south along much of the California coast. Winds blowing to the north along the coast counter upwelling tendencies, bring offshore water onshore and promote north flowing currents: these processes bring warm water toward shore. The PEG upwelling index quantifies the large scale tendency of winds to move warm water offshore bringing cool nutrient-rich water to the surface along shore. The California El Niño, being a warm water event, is characterized by increased negative upwelling index values. At 42°N, offshore from the California-Oregon border, the upwelling index values are positive (favoring upwelling) in the spring and summer, but become negative (favoring onshore transport of relatively warm water) in fall and winter. Figure 1 compares the sums of negative upwelling index values for the winters from 1951-1952 through 1982-1983. Note that the 1982-1983 winter (shown over 1983) is the most extreme of the series. The 1957-1958 winter is second, having the 70% magnitude of the 1982-1983 winter. Results of this type point to the possibility that the 1982-1983 coastal warming event was the most intense of this century.

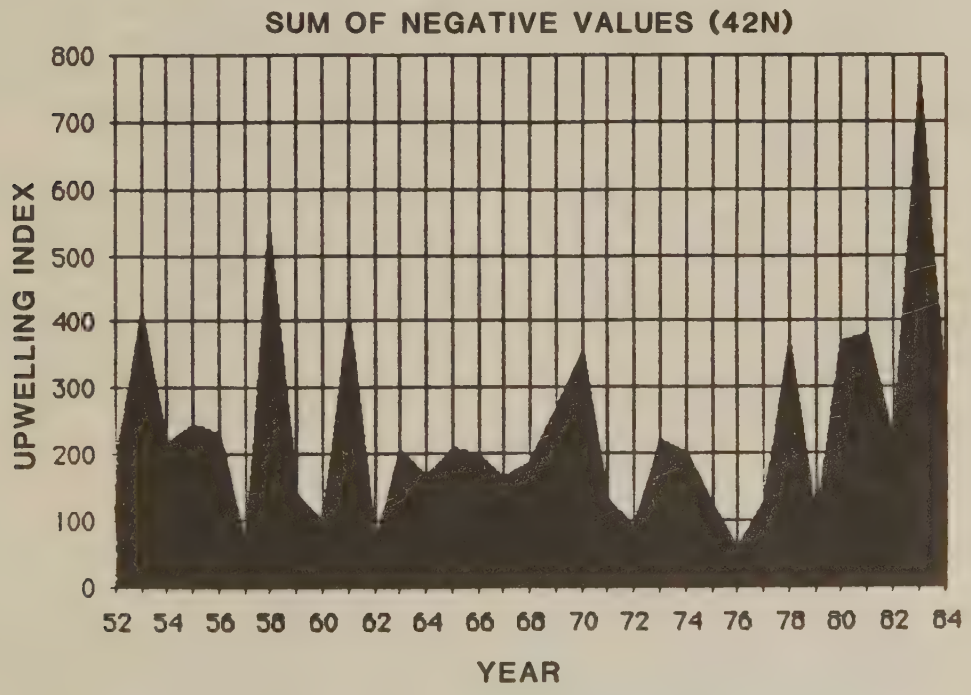


Figure 1. Sums of negative Upwelling Index values for the winter seasons 1951-52 through 1982-83. The 1951-52 winter is the first value. The ordinate is more negative upward. Minus signs are omitted.

TIBURON LABORATORY
Tiburon, California

Fish Communities Investigation

Key Developed for Identifying Juvenile Rockfishes

A key for the identification of young-of-the-year rockfishes, a critical requirement for studies of the Fish Communities Investigation, has been developed by Sharon Moreland, Biological Technician in the Groundfish Analysis Task at the Tiburon Laboratory. This key is being used to identify specimens collected in forecasting of year-class strength, and in studies of the recruitment process.

The key, based on meristics, was developed from data on 42 species of Sebastes taken from various sources, including the literature, museum specimens, and unpublished data from Tina Echeverria, a fellow Task member, and Dr. L.C. Chen, of San Diego State University.

After the specimens have been grouped on the basis of fin-ray counts, a dichotomous key--using gill-raker counts, lateral-line counts, head spination, anal-fin spines, and pigment characteristics--has been generally successful in identifications to species. Photographs have been provided for most species to augment the key. The key has been used to identify species taken in the June juvenile rockfish cruise (DSJ 84-06), including S. auriculatus, S. hopkinsi, S. rosaceus, S. umbrosus, and S. wilsoni--all species whose juveniles were not previously described.

As with any newly developed key, refinements continue to be made. The June cruise also provided specimens of S. entomelas, S. flavidus, S. melanops, S. mystinus and S. serranoides, a related complex of species notoriously difficult to distinguish as juveniles. Although previous work permits using meristics to distinguish the typical members of these groups, 5-10% have remained indistinguishable this way. Current work indicates pigmentation and body proportions will permit positive identification of these anomalous specimens.

Diel Patterns of Distribution in Zooplankton Investigated

Zooplankters distribute themselves differently between day and night in ways that profoundly influence the distribution of the fishes that feed on them. Earlier study had indicated major variations in these relationships, depending on the size of both zooplankters and fishes, but because the mesh size of the plankton net used in that work was relatively large (0.333 mm), data on the smaller zooplankters were limited. This was a serious limitation because these smaller zooplankters are the prey of young-of-the-year fishes, a primary focus of current study by the Predator-Prey Task. To remedy this, investigation leader Dr. Edmund Hobson and

fishery biologist Tony Chess, who were in Kona, Hawaii to assess the fish community on a reef under long-term study, collected a diel series of zooplankton samples above the reef with a finer mesh net (0.165 mm). The area was an appropriate place for initial consideration of the smaller forms because many of the concepts involving fish-plankton interactions developed from earlier study at this location.

The diurnal condition was sampled with plankton collections above the reef 1 hour after sunrise, at midday, and 1 hour before sunset--all over the same track. The nocturnal situation was sampled with similar collections 1 hour after sunset, at midnight, and 1 hour before sunrise--again, over the same track. Each set involved four 10-min replicates. In addition, organisms that are in the plankton during part of the diel cycle, but benthonic at other times, were trapped as they rose from the reef (Figure 1). The trapped organisms were retrieved shortly before sunrise, and shortly before sunset, in order to distinguish forms that entered the water column at night from those that did so by day. Analysis of the samples will begin shortly.

Figure 1. The trap used to sample organisms entering the plankton from the reef, photographed at night. The net used in this trap had a 0.165 mm mesh, compared to 0.355 mm in earlier versions.

Upwelling Effects Noted on Research Cruise

Members of the Predator-Prey Task, led by fishery biologist Peter Adams, recently returned from a four-day research cruise aboard the NOAA Ship David Starr Jordan. The purpose of the cruise was to determine the seasonal and temporal distribution of anchovy, juvenile rockfish, herring, and euphausiids. The data are to be used in conjunction with stomach samples of king salmon to determine under what conditions salmon switch from one prey to another.

During the cruise, 15 midwater trawls were made, wherein each of the five stations in the Gulf of the Farallones was sampled three times. The first set of trawls was taken during a period of no wind, when the surface temperature was approximately 16°C. The next day the weather changed, with strong northeasterly winds initiating upwelling, and by that night water surface temperatures had dropped 1.5°C.

Preliminary analysis of the trawl data indicates that after upwelling, anchovy catches were smaller. More complete anaysis of catch and length frequency data on anchovy should increase the understanding of the short-term impacts of upwelling on pelagic fishes.

Japanese Shark Researchers Visit Tiburon

On September 8, Tiburon fishery biologists Sus Kato and Susan Smith met to discuss work on elasmobranchs with visiting shark researchers Dr. Gregor Cailliet from Moss Landing Marine Laboratories, Moss Landing, California, and Dr. Toru Taniuchi of the University of Tokyo and Dr. Sho Tanaka of Tokai University in Japan. Smith presented a microscope demonstration of the age-validation technique she used for leopard shark, using tetracycline-marked vertebral sections, and in turn, learned more about the various techniques used by Japanese biologists in processing shark vertebral centra for aging.

Physiological Ecology Investigations

Activities Planned for New Groundfish Task

Dr. Jeannette Whipple and staff were occupied this month planning the activities of a new Task entitled, Physiological Ecology of Pacific Groundfish. They were assisted in the planning by David Mackett, Center Planning Officer, George Boehlert of the Honolulu Laboratory, and William Lenarz and Ed Ueber of the Tiburon Laboratory. The new Task will begin operation on October 1 as staff members divide their time between their new activities and completing write-ups of previous work on causes of mortality in striped bass.

FISHERIES INFORMATION SYSTEMS & ADP

Pacific Fisheries Information System (PACFIN) Processing Continues

Work continues on the PACFIN Research Information System to integrate 1982 California, Oregon, Washington and Coast Guard vessel and landings data into the present system. Susan Iacometti, Computer Systems Programmer, completed the data verification of the 1982 Oregon commercial catch data. The verification process of the Washington State data tape showed the data had not been sorted. The tape, which was sent back to Washington for sorting, has been returned by their programmer for reverification by Iacometti. The Coast Guard tape of new vessel registration data requires reformatting before merging with the Vessel Data Base.

The west coast salmon data subcommittee met on September 11, in Portland, Oregon. Jerry Hornoff, Systems Analyst, represented the SWFC. The meeting was chaired by Will Daspit, Pacific Marine Fisheries Commission, and the discussion focused on the problems and costs associated with adding historical salmon data to the PACFIN system. The subcommittee agreed to try to integrate salmon data in the current PACFIN groundfish data elements and data flow. Initially the data base will only include commercial salmon catches. The states represented (California, Oregon, and Washington) agreed to the submission of a test data set to Daspit by January 1, 1985.

The west coast groundfish data subcommittee met on September 12 in Portland, Oregon. The agenda called for a discussion on the merger of the PACFIN and PMC data series. After some discussion, it became apparent that the source of the PMFC data series was quite separate from the PACFIN system. The subcommittee recommended that a more feasible approach would be to improve the current PMFC data system.

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This month also, Hornoff converted the information systems utilized by the SW Region from ADP to Information Consultants, Inc. The major systems include enforcement, market news, and economics. Bob Young, NOAA Liaison for ICI, visited the SWR on September 21 and met with the SWFC programming staff at Terminal Island. The discussion focused on the system configuration, communications, and expected growth. NMFS users are grouped together on one processor (System D). The main communications network supported on this processor is Uninet. However, access through Telenet or Tymnet is also available. For micro to mainframe communications ICI has implemented a DEC-20 version of KERMIT. ICI anticipates that future growth will involve the additions of VAX machines with nationwide networking capability.

CalCOFI Data System

On July 23, a CalCOFI Objectives and Issues Planning Meeting was chaired by Director Izadore Barrett and facilitated by David Mackett, Program and Planning Officer. The primary goals for the meeting were to achieve a shared understanding of the system objectives and to understand the issues which need to be resolved in future planning work sessions. The participants included John Carr, Rich Charter, Larry Eber, John Hunter, Reuben Lasker, Geoff Moser, Dorothy Roll, and Jim Thrailkill.

In preparation for the following planning meeting, Dorothy Roll, Computer Systems Analyst, and Rich Charter, Computer Specialist, prepared the options report for review by Dr. Barrett. The options were for the 29 issues developed during the July 23 meeting.

The ad hoc CalCOFI Data Systems Planning Committee, facilitated by David Mackett, was held September 13-14. The SWFC participants were: Izadore Barrett, John Carr, Rich Charter, Larry Eber, Fred Kellenberger, Reuben Lasker, Dorothy Roll, and Jim Thrailkill. Dr. Andy Jahns participated during the first day's session. Observers were Rob Bistodeau, Barbara MacCall, Cindy Meyer, Elaine Sandknop, Betsy Stevens, and Larry Zins. After discussion of the options and the review of the status of the current activities, the group identified the detailed activities to complete the project, developed a PERT chart, and estimated the duration and resources required for the activities.

Work Continues on Upgrading WPACFIN System

David C. Hamm, Computer Systems Analyst, continued the implementation of the Guam Commercial Landings System for the Western Pacific Fishery Information Network (WPACFIN). Historical data from three major fish wholesalers on Guam have now been entered and edited, and summary reports were produced and distributed.

Hamm also reports that hardware has been upgraded with the addition of a third floppy disk drive for each of the microcomputer systems in the American Samoa Office of Marine Resources, Northern Mariana Islands Division of Fish and Wildlife, and the Honolulu Laboratory. An "uninterruptible" power supply was also added to the American Samoa system to help minimize the disruption of the frequent power outages in American Samoa. The data base management system software in use at American Samoa, the Northern Mariana Islands, and the Honolulu Laboratory is now the latest version available.

The first version of the creel survey data expansion system for the Northern Mariana Islands was also completed. The system is patterned after the one being used in Guam, but has several significant modifications to accommodate differences in survey design and sampling. The system is designed to provide estimates of total monthly catch, effort, and participation for Saipan.

Other ADP Activities

During the week of September 24 while the David Starr Jordan was in port, Susan Iacometti performed post-cruise and pre-cruise maintenance on the shipboard Molecular Supermicro 15-8. She and Rich Charter also made preliminary tests of the Application Processor 8015. This AP is required for interfacing the CAMAC with the Molecular on an interrupt mode. The CAMAC is the electronic data collection system developed and maintained by National Ocean Service.

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Bob Nydam, Computer Programmer, accepted a computer programming position in the San Diego Naval facility. Before his new assignment, effective October 1, he successfully installed the sheet feeder for the NEC letter quality printer in the Director's Office. The sheet feeder is mechanically functional and the WordStar version for the Director's Office La Jolla Standard microcomputer has been adapted for use with the sheet feeder.

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Fred Kellenberger has received a copy of the supplement to the proposal to the National Science Foundation (NSF) on the Supercomputer. The SWFC is a member of the San Diego Supercomputer (SDSC) consortium that is attempting to obtain a supercomputer for the UCSD campus. The major additions are increased computer power and a four-processor CRAY X/MP/48. Funding is requested at $70.3 million for five years beginning in 1985. NSF intends to make a decision on the proposal in early 1985.

ADMINISTRATIVE ACTIVITIES

Update on A-76 Activities

On September 24, the Southwest Fisheries Center received the final Management Efficiency Study (MES) resulting from Arthur Young and Co.'s review of the Center's ADP activities, thus completing Phase I under the current contract. This MES is the result of a study conducted under the authority of Office of Management and Budget Circular A-76 requiring governmental activities to be reviewed in order to determine if the work currently performed by government employees can be done more economically by contract.

The Center's administrative staff, headed by executive officer Ben Remington, is currently reviewing the recommendations contained in the MES. Recommendations to NOAA, through NMFS, Washington, DC, are expected to be forwarded in October 1984.

MISCELLANEOUS

Honors and Awards

Honolulu Laboratory

September 28 - Laboratory Director R. Shomura presented service pins and certificates to Paul M. Shiota (20 years), Shoji Teramoto (25 years), and Tamotsu Nakamura (35 years) at a general staff meeting at the Honolulu Laboratory.

Tiburon Laboratory

September 25 - Sharon Moreland, Biological Technician at the Tiburon Laboratory, Special Act Award.

Seminars

La Jolla Laboratory

September 25 - Dr. Marc Mangel, Department of Mathematics, University of California, Davis, presented a lecture, "Prediction of Future Ocean-Perch Catches Based on Search Time."

- Bobette Williamson, Motivators, Inc., presented a talk on Time Management.

Pacific Environmental Group

September 21 - Jerry Norton presented a seminar to the PEG staff on "The 1982-83 El Niño Event off Baja and Alta California."

Tiburon Laboratory

September 19 - Dr. George Boehlert, NMFS Honolulu Laboratory, presented a lecture: "Reproduction and embryonic energetics in Sebastes: A comparison of eastern and western Pacific species."

Visitors

Honolulu Laboratory

September 4 - Dr. Kunio Amaoka of the Faculty of Fisheries, Hokkaido University, Hokodate, Japan, visited Dr. G. Boehlert and Michael Seki.

18 - Dr. Philip Helfrich of HIMB, UH, visited Richard Shomura to discuss mahimahi research in Hawaii.

24 - Dr. Phil Lobel, Woods Hole Oceanographic Laboratory, visited Dr. Boehlert to discuss research at Johnston Atoll and other projects in tropical waters.

La Jolla Laboratory

September 10-14 - Carol Thomas, Chief of Staffing, WASC, Personnel Office, Seattle, Washington.

17-19 - Dr. Joseph W. Angelovic, Deputy Assistant Administrator for Science and Technology, NMFS, Washington, DC, was at the Center to meet with Director Barrett and attend the tuna/dolphin planning session.

20 - Five members of the Shizuoka Prefecture, Japan Industrial Youth Study Group, led by Mitsuo Yamashita, visited the Center for a brief lecture on fisheries presented by Dr. Norm Bartoo of the Oceanic Fisheries Resources Division.

24-25 - David Rice, Personnel Division, Western Administrative Support Center, Seattle, Washington.

26 - Jim Slawson, Roger Wolcott and Tom Yocom, SW Regional Office, Terminal Island and Tiburon, California.

Pacific Environmental Group

September 5 - Dr. Larry Breaker of the Naval Postgraduate School Oceanography Department met with Doug McLain. Breaker is interested in the possibility of comparing sea surface temperatures at California shore stations with surface and subsurface data offshore.

Meetings and Travel

Honolulu Laboratory

September 9 - Richard Shomura traveled to Honolulu after visits to New Caledonia, Indonesia, Taiwan, Republic of Korea (ROK), and Japan. He met with officials of the latter three countries to encourage their participation in the workshop on Fate and Impact of Marine Debris (FIMD) which is scheduled in Honolulu on November 26-29, 1984. Taiwan and ROK will be sending scientists to the workshop, and the outlook for Japan appears to be encouraging.

7-13 - Richard Shomura traveled to Seattle, Washington, for a meeting with the steering group of the FIMD workshop, and to La Jolla, California, to participate in the Center Management Meeting.

10 - Dr. George Boehlert traveled to Seattle, Washington, where he visited the Northwest and Alaska Fisheries Center to discuss hydroacoustics and present a seminar on seamount research. He also traveled to Corvallis and Newport, Oregon, where he worked on cooperative groundfish research, and to the SWFC Tiburon Laboratory where he participated in a program review.

25 - Richard Shomura called a meeting of representatives from Honolulu agencies cosponsoring the FIMD workshop to discuss workshop arrangements. In attendance were Dr. Jack Davidson and Claire Nakamura of the UH Sea Grant Program; Kitty Simonds of the Council; Ernest Kosaka, who represented Dr. Allan B. Marmelstein of the U.S. Fish and Wildlife Service; and Honolulu Laboratory staff members Richard Uchida, William G. Gilmartin, Bernard M. Ito, and Carole A. Yukihiro.

28 - Richard Shomura called a general staff meeting to discuss missing equipment and future research direction of the Laboratory.

La Jolla Laboratory

August 29-September 4 - Senior Scientist William Perrin attended the first Biennial Cetacean Society Meeting in Monterey, California.

September 4-8 - Sandra Hawes traveled to Santa Barbara Island, California and San Pedro, California, to tag sea lion pups to collect sea lion scat samples.

5-6 - An Expert Consultation on the Movements and Exchange Rates of Tunas, chaired by Dr. John Hunter and sponsored by the Inter-American Tropical Tuna Commission (IATTC) brought together visiting experts Sandy Argue, Canada, Alain Fonteneau, France, Robert Francis of Seattle, Washington, Dan Goodman, Montana,

and Gunter Seckel, Monterey, California. Also attending from the IATTC and the Southwest Fisheries Center were William Bayliff, Pierre Kleiber, Alec MacCall, Pat Tomlinson, and Andy Dizon.

According to Hunter, this is the first of a series of four workshops on the dynamics of tuna movements. The objective of this session was to discuss the results of conventional tagging studies, their uncertainties and biases, and the approaches that could be used to improve their design. The goal of all four sessions is to produce a report which will outline long-term research options for studying the movements and exchange rates of tunas and which may serve as a basis for discussion for an international program on the dynamics of tuna movements.

10 - A meeting of the Advisory Committee to the Inter-American Tropical Tuna Commission at the Southwest Fisheries Center was attended by Director Barrett and Division Chief Sakagawa.

10-14 - Paul Smith traveled to Seattle, Washington, to present an invited El Niño paper for the International Recruitment Investigations meeting.

11-12 - In addition to Director Barrett, Deputy Director Carr, Planning Officer Mackett, Division Chiefs Lasker and Sakagawa, Executive Officer Ben Remington, and Data Systems Manager Fred Kellenberger, the following members of the Center Management Team traveled to La Jolla, California, for a meeting: Directors Norm Abramson of the Tiburon Laboratory, Andy Bakun of PEG, and Richard Shomura of the Honolulu Laboratory.

12-14 - Steve Reilly traveled to Monterey, Tiburon, and Pt. Reyes, California, to consult with the staff of PEG, conduct joint research at Pt. Reyes Bird Observatory, and to visit Tiburon Laboratory.

- Alec MacCall traveled to Sacramento and Eureka, California, to attend CDF&G Salmon Staff Meeting as the NMFS-SWFC Salmon Specialist to help develop a management model and to observe the fishery on the Klamath River.

September 15-December 15 - Ron Dotson traveled to Azores, Portugal to implement an experimental tuna fisheries development project. At the conclusion of the project he will travel to Rome, Italy, to write-up and present results of the work accomplished.

17-20 - John Hunter traveled to Seattle, Washington, to attend a Site Visit, University of Washington Sea Grant Program.

18-19 - Among the participants in the ad hoc NOAA/Marine Mammal Commission Committee for Coordination of the Dolphin Monitoring Survey were: William Matuszeski, Deputy Assistant Administrator for Ocean Services and Coastal Zone Management, National Ocean Service; Donald Montgomery, Director, Office of Ocean Services, National Ocean Service, Commander Robert Roush, Chief, Program Planning Group, National Ocean Service, Joseph Huang, Ocean Climate Activities, NOAA, William Evans, Chairman, Marine Mammal Commission, Dr. Joseph Angelovic, Deputy Assistant Administrator for Science and Technology, NMFS; Richard Roe, Director, Office of Protected Species and Habitat Conservation, NMFS; Gary Smith, Deputy Regional Director, Southwest Region. The representatives from the SWFC included Director Barrett, John Carr, Dave Mackett, Gary Sakagawa and Wesley Parks. Mackett acted as facilitator during the planning sessions.

19-21 - Dave Mackett traveled to Tiburon, California, to facilitate Groundfish Research Program Planning Session.

19-24 - Charles Oliver and Jeanne Wexler traveled to San Clemente Island to conduct annual pup tagging of California sea lions.

September 20-October 20 - Angeles Alvariño traveled to La Paz, Mexico, to present a series of seminars to graduate and post-graduate biologists at CICIMAR.

21-24 - Mark Lowry traveled to San Nicolas Island, California, to tag sea lion pups and collect scats.

September 30-October 5 - Director Barrett traveled to Williamsburg, Virginia, to attend Department of Commerce Executive Forum, Session VI.

Pacific Environmental Group

September 11-12 - Andy Bakun traveled to the Southwest Fisheries Center for the Center Management Meeting.

12-13 - Andy Bakun attended an IRIS (International Recruitment Investigations in the Subarctic) Council meeting and an IRIS Subarctic El Nino Workshop in Seattle, Washington.

- Donna Mallicoate and Dick Parrish traveled to Long Beach, California, to visit California Department of Fish and Game and discuss wetfish database management and analysis.

Public Affairs

Federal Women's Program Launches New Year of Activities

October 1984 begins a new year of seminars and workshops sponsored by the Federal Women's Program (FWP) at La Jolla, California. Shown below are members of the committee. Left to right: Sandy Hawes, Jean Michalski, and Aleta Hohn. Michalski is replacing Nancy Lo, who will continue service on the Center's EEO Committee.

In September, the committee members conducted a survey of women employees at the La Jolla Laboratory to ascertain which activities during the past were the most helpful and popular, and to determine the topics that were of greatest interest and concern to the staff during the coming year; 35 responses were received as a result of the survey. Communication skills (verbal or written) were the most popular topics, with creative problem solving, financial planning for women, balancing career and family, and the challenge of leadership for women following in order. Based on these results, some of the topics will be the subject of FWP-sponsored seminars and workshops during the coming year.

In October, the FWP promoted Women's Opportunity Week, an annual event in San Diego and the third consecutive year that women at the SWFC have participated. In November, a workshop on "Balancing Career and Life" is scheduled. This workshop, which will be conducted by Dr. Lori Kolt, will focus on working women and role conflict, career priorities in dual career families, housekeeping options, and other issues important to today's career women.

The FWP committee members encourage all staff, men and women, to participate in the programs so that FY 1985 will be as successful as last year.

La Jolla Laboratory

September 2 - Debra Losey, Technical Information Specialist - Appointment.

- Larry C. Wyckoff, Biological Technician - Appointment.

12 - George Lundy, Editorial Assistant - Appointment.

14 - Amy Kimball, Biological Science Student Trainee - Resignation.

18 - Robert Pitman, Biological Technician (Wildlife) - Termination.

28 - Ronda Hageman, Industry Economist - Expiration of Appointment.

30 - Elizabeth Vetter, Operations Research Analyst - 2-Year Term Appointment.

Pacific Environmental Group

September 1 - Janet Mason, Biological Technician - Conversion to Part-Time Permanent Position.

15 - John Trares, Oceanographer - Resignation.

Tiburon Laboratory

September 9 - Frank Jacques, Biological Student Science Trainee - Leave Without Pay.

16 - Maxwell Eldridge, Fishery Biologist (Research) - Promotion.

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